PERFORMING VISUAL INSPECTIONS

Prepared by	Charles H. Greenhalgh, Jr.	Approval	Original signed by Thomas Noll for Organizational Unit Manager

GENERAL INFORMATION
The following records are generated by this procedure and should be maintained in accordance with CID 1440.7:

- Nondestructive Examination Status Sheets

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I. Requirements Which Apply to All Visual Inspections Performed Under This Task Description.

A. Codes and Standards

1. American Society for Nondestructive Testing (ASNT) Standard for Qualification and Certification of Nondestructive Evaluation Personnel – ANSI/ASNT-CP-189 or ASNT/TC1A, (current editions).
2. American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes (current editions).
3. American National Standard Institute (ANSI) Pressure Piping Codes (current editions).
4. American Welding Society (AWS) Structural Welding Codes D1.1, D1.2, and D1.6 (current editions).
5. Drawings or other special instructions from the requester.
6. American Welding Society document, AWS B1.11 Guide for the Visual Examination of Welds (current edition)

B. Personnel Requirements

Personnel performing these inspections shall be certified either (a) in the specified technique to a minimum of Level II in accordance with LMS-TD-5572 or the American Society for Nondestructive Testing Standard for Qualification and Certification of Nondestructive Evaluation Personnel – ANSI/ASNT-CP-189 or ASNT-TC1A (current editions) or (b) as a Certified Welding Inspector by the American Welding Society.

C. Required Material and Equipment

The following non-inclusive list of equipment shall be used to the extent required to perform individual inspections under this task description.

Item	Description
Illumination Equipment	Flashlights, fiber-optic cold light with fiber bundles, spot, or area flood lights
Vision Aids	Microscopes, jeweler's loupes, magnifiers, and coddington lenses
Measuring Devices	Scales, rules, gages, micrometers, verniers, reticules, and remote measuring bore scope adapters
Remote Viewing Devices	Fiber-optic or rigid bore scopes, periscopes, mirrors, television, video, digital, and standard film cameras
Recording Devices	Charts, drawings, video recorder, or conventional film or radiographic image

D. Initial Conditions

The welds or components to be visually inspected shall be free of rust, grease, or any other material which may obscure defects. Any large-scale removal of material shall be performed only at the direction of the organization which funds the inspection, the recertification requester, or the research facility. Visual examinations, which require clean or specially prepared surfaces for valid interpretation of results, shall be preceded by the appropriate cleaning process or method. The weld or component being visually inspected shall be illuminated to attain a minimum of 15 foot-candles. Flashlights or other auxiliary lighting may be used as necessary to produce the minimum illumination. There shall be no glare or shadows which would interfere with the detection of anomalies.

E. Reporting

Inspection reports shall include drawings and/or sketches marked to show rejectable and/or reportable areas. All test equipment used must be identified in the report so that this equipment, or its equivalent, can be used for future inspections. Reports must be submitted to the Research Hardware Validation and Verification Branch representative responsible for the inspection task, the NASA Facility Safety Head, and the organization funding the inspection.

II. Requirements Which Apply to Specific Types of Visual Inspections Performed Under This Task Description.

A. Visual Inspection of Pressure Piping (covers both new piping and RECERT Phase 1 and 2 inspections [Reference 1] of existing piping)

1. Introduction

This inspection procedure identifies the requirements for performing visual inspections of piping welds and components in accordance with ASME B31.3, Chemical Plant and Petroleum Refinery Piping Code.

The inspection consists of observation of all portions of the piping, welds, and components (except pressure vessels) which are exposed to observation.

2. Acceptance Standards

(a) Welds – See Figure 1 and the following table:

Item	Criteria
Cracks	None allowed
Undercut	None allowed in longitudinal groove welds. 1/32 in. or 0.2 T_w*, whichever is less, allowed in girth, miter groove and branch connection welds. *T_w = wall thickness of welded pipe or base material thickness.
Incomplete Penetration	None allowed.
Lack of Fusion	None allowed.
Surface Porosity or Exposed Slag Inclusion	None allowed.
Root Concavity (Suck up)	Shall not exceed actual reinforcement size.

Item	Criteria
Weld Reinforcement or Internal Protrusion	Shall not exceed: For T_w — Height ≤ ¼ in. — ≤ 1/16 in. > ¼ in., ≤ ½ in. — ≤ 1/8 in. > ½ in., ≤ 1 in. — ≤ 5/32 in. > 1 in. — ≤ 3/16 in. *T_w = wall thickness of welded pipe or base material thickness. Fillet weld sizes must be as given below: Slip On and Socket Welded Flanges: Leg ≥ the lesser of: • 1.4 x the pipe wall thickness • the thickness of the hub at the welded end Socket Welded Components Other Than Flanges: Leg ≥ 1.25 x the required design thickness but not less than 1/8 in. Branch Connections at the Branch: Leg ≥ the lesser of: • the thickness of the run • 0.354 in. (1.4-in. throat) Branch Connections at the Edge of Reinforcing Pad: Leg ≥ 0.707 x the pad thickness

(b) Components

Any condition which is a safety hazard shall be reported. Due to the large variety of piping components which may be encountered, the following conditions must also be reported:

Item	Criteria
Surface Condition	Evidence of corrosion, pitting, gouging, dents, or handling damage is reportable. Scaling red rust and/or wetness are rejectable.
Leakage	Evidence of leakage such as stains, steam, or wetness is rejectable.
Table continued Cracks	Cracks in any vessel, weld, or component are rejectable.
Insulation	Loose, torn, liquid-soaked, or missing insulation is rejectable.
Wear	Any loss of material due to mechanical interference between components or supports is rejectable.
Vibration	Evidence of any component movement in excess of 1 in. is rejectable.
Fasteners	Failed, missing, damaged, or undersized fasteners are rejectable. Any nut having more than one thread disengaged is rejectable.

Item	Criteria
Supports	Loose, failed, or missing supports are rejectable.
Foundations	Corroded, broken, inadequate, or shifted foundations are rejectable.
Hoses	The entire length of flexible hoses must be inspected. Hoses without NASA or manufacturer pressure-rating tags and/or with visible defects such as cracking, blistering, wear, corrosion, and kinking are rejectable. Hoses without anti-whip devices are reportable and the Pressure Systems Manager shall decide type and/or necessity of these devices.
Relief Valves/Unloaders	Relief valves that vent into areas where people or equipment can be endangered or into enclosed areas are rejectable. Relief valves that do not have exhaust lines or equalizing tees are rejectable, subject to Pressure Systems Manager review. Relief valves/unloaders which do not have current calibration tags are rejectable. Non-carbon steel relief valves, both indoor and outdoor, shall be calibrated every five (5) years. Carbon steel relief valves shall be calibrated every three (3) years when used outdoors and every five (5) years when used indoors.
Tubing	Tubing which is crimped or severely misaligned with fittings is rejectable. Tubing without adequate supports is reportable.
Valves	Valves with missing NASA number tags, levers or hand wheels are reportable.
Gauges	Broken gauges, including gauges with broken glass, and gauges that do not have current calibration stickers are rejectable.
Crevices	Crevices which show signs of corrosion are reportable.

B. Visual Inspection of Pressure Vessels (covers both new vessels and RECERT Phase 1 and 2 inspections (Reference 1) of existing vessels.

1. Introduction

This inspection procedure identifies the requirements for performing a visual inspection of pressure vessels in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

The inspection consists of observation of all portions of the pressure vessel shell, supports, and welds which are exposed to observation.

2. Acceptance Standards

(a) Welds – See Figure 1 and the following table:

Item	Criteria
Cracks	None allowed
Undercut	1/32 in. or 0.2 T_w*, whichever is less, allowed in longitudinal, girth, and miter groove welds. *T_w = wall thickness of welded pipe or base material

Item	Criteria
	thickness.
Lack of Fusion	None allowed.
Incomplete Penetration	None allowed.
Surface Porosity or Exposed Slag Inclusion	None allowed.
Root Concavity (Suck up)	Must not exceed actual reinforcement size.
Butt Weld Reinforcement or Internal Protrusion	Not to exceed: For T_w — Height ≤ ¼ in. — ≤ 1/16 in. > ¼ in., ≤ ½ in. — ≤ 1/8 in. > ½ in., ≤ 1 in. — ≤ 5/32 in. > 1 in. — ≤ 3/16 in. *T_w = wall thickness of welded pipe or base material thickness. Fillet weld sizes must be as given below: Slip On and Socket Welded Flanges: Leg ≥ the lesser of: • 1.4 x the pipe wall thickness • the thickness of the hub at the welded end Socket Welded Components Other Than Flanges: Leg ≥ 1.25 x the required design thickness but not less than 1/8 in. Pressure Vessel Nozzle Welds: Leg ≥ the lesser of: • 0.354 in. (1/4 in. throat) • the nominal branch wall thickness Pressure Vessel Nozzle Welds at the Edge of Reinforcing Pad: Leg ≥ 0.707 x the pad thickness Flat Plates in Pressure Vessels: Leg ≥ the thinner of the two attached plates For Pressure Vessel Supports: • Leg ≥ 1.4 x the support thickness if single welded • Leg ≥ 0.7 x the support thickness if double welded *T_w = wall thickness of welded pipe or base material thickness.

(b) Components

Any condition which is a safety hazard shall be reported. Due to the large variety of pressure vessels which may be encountered, the following conditions must also be reported:

Item	Criteria
Surface Condition	Evidence of corrosion, pitting, gouging, dents, or handling damage is reportable. Scaling red rust and/or wetness are rejectable.
Leakage	Evidence of leakage such as stains, steam, or wetness is rejectable.
Cracks	Cracks in any vessel, weld, or component are rejectable.
Insulation	Loose, torn, liquid-soaked, or missing insulation is rejectable.
Wear	Any loss of material due to mechanical interference between components or supports is rejectable.
Vibration	Evidence of any component movement in excess of 1 in. is rejectable.
Fasteners	Failed, missing, damaged, or undersized fasteners are rejectable. Any nut having more than one thread disengaged is rejectable.
Supports	Loose, failed, or missing supports are rejectable.
Foundations	Corroded, broken, inadequate, or shifted foundations are rejectable.
Relief Valves/Unloaders	Relief valves that vent into areas where people or equipment can be endangered or into enclosed areas are rejectable. Relief valves that do not have exhaust lines or equalizing tees are rejectable, subject to Pressure Systems Manager review. Relief valves/unloaders which do not have current calibration tags are rejectable. Non-carbon steel relief valves, both indoor and outdoor, shall be calibrated every five (5) years. Carbon steel relief valves shall be calibrated every three (3) years when used outdoors and every five (5) years when used indoors.
Tubing	Tubing which is crimped or severely misaligned with fittings is rejectable. Tubing without adequate supports is reportable.
Valves	Valves with missing NASA number tags, levers or hand wheels are reportable.
Gauges	Broken gauges, including gauges with broken glass, and gauges that do not have current calibration stickers are rejectable.
Crevices	Crevices which show signs of corrosion are reportable.

C. Visual RECERT Phase 3 Inspection (Reference 1) of existing pressure systems.

1. Introduction

The purpose of this procedure is to establish the methods and reporting requirements for the RECERT Phase 3 visual examination of pressure systems.

This procedure identifies the requirements for performing a visual inspection of system piping, welds, and components.

The inspection consists of visual observation of exposed external portions of the piping, welds, and components. The system inspection plan will specify when visual inspection of internal portions of the piping, welds, and components is required.

2. Inspection Plan

The visual inspection must be performed in accordance with an approved inspection plan. Inspection plans will be developed by the Pressure Systems Manager and contain, as a minimum, the following:

(a) System to be inspected
(b) Components and/or welds to be inspected
(c) Type or class of inspection to be performed
(d) Reference drawing numbers
(e) Dates for initial and follow-up inspection

3. Inspection Procedure

All systems must be inspected from all possible angles. Care must be exercised to insure complete coverage of each system to the extent that configuration and surrounding equipment allow.

Storage vessel inspection consists of observation of all portions of the pressure vessel shell, the shell penetrations, and reinforcing plates including welds, supports, and foundations which are exposed to observation after fabrication. The pressure vessel boundary is the first weld or flange on a pipe leaving the pressure vessel, or as identified by drawing.

Weld and component inspection consists of observation of all portions of piping, welds, supports, or components which are exposed to observation after fabrication.

4. Acceptance Standards

Any condition which is a safety hazard shall be reported. Due to the large variety of storage vessels, piping components and ancillary equipment which may be encountered, the following must also be reported:

Item	Criteria
Surface Condition	Evidence of corrosion, pitting, gouging, dents, or handling damage is reportable. Scaling red rust and/or wetness are rejectable.
Leakage	Leakage in gaseous systems is rejectable. Leakage in volatile and/or toxic liquid systems is rejectable. Leakage in non-volatile and/or non-toxic liquid systems is reportable.
Cracks	Cracks in any vessel, weld, or component are

Item	Criteria
	rejectable.
Insulation	Loose, torn, liquid-soaked, or missing insulation are rejectable.
Wear	Any loss of material due to mechanical interference between components or supports is rejectable.
Vibration	Evidence of any component movement in excess of 1 in. is rejectable.
Fasteners	Failed, missing, damaged, or undersized fasteners are rejectable. Any nut having more than one thread disengaged is rejectable.
Supports	Loose, failed, or missing supports are rejectable.
Foundations	Corroded, broken, inadequate, or shifted foundations are rejectable.
Welds	Insufficient or excessive weld reinforcement, excessive undercut, or lack of fusion are rejectable.
Hoses	The entire length of flexible hoses must be inspected. Hoses without NASA or manufacturer pressure-rating tags and/or with visible defects such as cracking, blistering, wear, corrosion, and kinking are rejectable. Hoses without anti-whip devices are reportable and the Pressure Systems Manager shall decide type and/or necessity of these devices.
Relief Valves/Unloaders	Relief valves that vent into areas where people or equipment can be endangered or into enclosed areas are rejectable. Relief valves that do not have exhaust lines or equalizing tees are rejectable, subject to Pressure Systems Manager review. Relief valves/unloaders which do not have current calibration tags are rejectable. Non-carbon steel relief valves, both indoor and outdoor, shall be calibrated every five (5) years. Carbon steel relief valves shall be calibrated every three (3) years when used indoors and every five (5) years when used outdoors.
Tubing	Tubing which is crimped or severely misaligned with fittings is rejectable. Tubing without adequate supports is reportable.
Valves	Valves with missing NASA number tags, levers or hand wheels are reportable.
Gauges	Broken gauges, including gauges with broken glass, and gauges that do not have current calibration stickers are rejectable.
Crevices	Crevices which show signs of corrosion are reportable.

D. Visual Inspection of Structural Systems

1. Introduction

This inspection procedure identifies the requirements for performing a visual inspection of structural welds and components in accordance with American Welding Society's (AWS) Structural Welding Codes D1.1, D1.2, and D1.6 (current editions).

The inspection consists of observation of all portions of the structural welds or components which are exposed to observation after fabrication.

2. Acceptance Standards

(a) Welds in statically-loaded steel structures – See Figure 1 and the following table.

Item	Criteria
Cracks	None allowed
Undercut	Material < 1 in. thick – a maximum of 1/32 in. allowed except a maximum of 1/16 in. allowed for an accumulated length of 2 in. in any 12 in. Material ≥ 1 in. thick – a maximum of 1/16 in. allowed.
Lack of Fusion	None allowed
Incomplete Penetration	None allowed except in intermittent fillet welds outside their effective length.
Surface Porosity	The sum of diameters of porosity 1/32 in. or greater must not exceed 3/8 in. in any 1 in. of weld or ¾ in. in any 12 in.
Fillet Weld Profile	The nominal fillet size must not differ by more than 1/16 in. in any continuous fillet weld along more than 10% of the length.
Butt Weld Profile	Concavity must not exceed 1/16 in. The throat must not be less than the thickness of the thinner base metal.
Weld Profiles	Shown in Figure 1.
Fillet Weld Sizes	For fillets used to reinforce groove welds: Leg ≥ the lesser of • 0.25 x the thickness of the thinner part joined. • 3/8 in. For all other fillet welds: Base metal Thickness (t) — minimum weld size* — maximum weld size ≤ ¼” — 3/16” — t 5/16” to ½” — 3/16” — t – 1/16” 9/16” to ¾” — ¼” — t – 1/16” 13/16” and over — 5/16” — t – 1/16” * Weld size need not exceed the thickness of the thinner part joined.

(b) Welds in tubular and/or dynamically-loaded steel structures – See AWS D1.1 (current edition).

(c) Welds in aluminum and stainless steel structures – See AWS D1.2 and D1.6 (current editions), respectively.

(d) Components

Any condition which is a safety hazard shall be reported. Due to the large variety of structural systems which may be encountered, the following conditions must also be reported:

Item	Criteria
Surface Condition	Evidence of corrosion, pitting, gouging, dents, or handling damage is reportable. Scaling red rust and/or wetness are rejectable.
Leakage	Evidence of leakage, stains, steam, or wetness is rejectable.
Cracks	Cracks in any structure, weld, or component are rejectable.
Insulation	Loose, torn, liquid-soaked, or missing insulation is rejectable.
Wear	Any loss of material due to mechanical interference between components or supports is rejectable.
Vibration	Evidence of any component movement in excess of 1 in. is rejectable.
Fasteners	Failed, missing, damaged, or undersized fasteners are rejectable. Any nut having more than one thread disengaged is rejectable.
Supports	Loose, failed, or missing supports are rejectable.
Foundations	Corroded, broken, inadequate, or shifted foundations are rejectable.

E. Visual Inspection of Composite Materials

1. Introduction

This inspection procedure identifies the requirements for performing a visual inspection of composite materials in accordance with the ASME Boiler and Pressure Vessel Code, Section X.

The inspection consists of observation of all illuminated portions of the composite materials after fabrication.

2. Lighting Requirements for Translucent Visual Inspections

Translucent visual examination uses artificial lighting which radiates from an illuminator. The illuminator shall produce directional lighting which will diffuse light evenly through the area under examination. Ambient lighting shall (a) produce no surface glare or reflections from the surface under examination and (b) be less intense than the light which passes through the composite material. The illuminator shall have sufficient intensity to permit candling of any laminate thickness variations.

3. Acceptance Standards

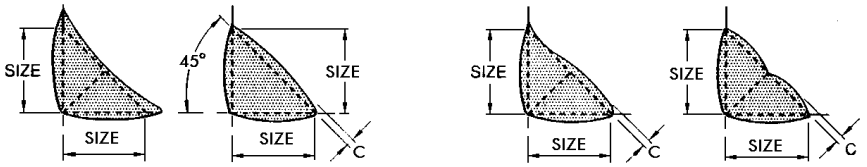
There are four acceptance levels for composite materials. The composite-material user shall determine which of the four levels is appropriate for his application. Levels I, II, and III are defined in the following table. The composite-material user specifies Level IV acceptance criteria.

Name	Definition	Visual Acceptance		
		Level	Level	Level
Chip	A small piece broke off an edge or surface	None	Maximum dimension of break, 3.0 mm (1/8 in.)	Maximum dimension of break, 6.5 mm (1/4 in.)
Crack	An actual separation of the laminate, visible on opposite surfaces, and extending through the thickness	None	None	None
Crack, surface	Crack existing only on the surface of the laminate	None	Maximum length, 3.0 mm (1/8 in.)	Maximum length 6.5 mm (1/4 in.)
Crazing	Fine cracks at or under the surface of a laminate	None	Maximum dimension of crazing, 13 mm (1/2 in.)	Maximum dimension of crazing, 25 mm (1 in.)
			Frequency and location to be determined by customer	
Delamination, edge	Separation of the layers of material at the edge of a laminate	None	Maximum dimension, 3.0 mm (1/8 in.)	Maximum dimension, 6.5 mm (1/4 in.)
Delamination, internal	Separation of the layers of material in a laminate	None	None	None
Dry-spot	Area of incomplete surface film where the reinforcement has not been wetted with resin	None	Maximum diameter, 9.5 mm (3/8 in.)	Maximum diameter, 14 mm (9/16 in.)
Foreign inclusion (metallic)	Metallic particles included in a laminate which are foreign to its composition	None	None, if for electrical use; maximum dimension, 0.8 mm (1/32 in.), 1/9 m^2 (1 ft^2), if for mechanical use	None, if for electrical use; maximum dimension, 1.5 mm (1/16 in.), 1/9 m^2 (1 ft^2), if for mechanical use
Foreign inclusion (nonmetallic)	Nonmetallic particles included in a laminate which seem foreign to its composition	None	Maximum dimension, 0.8 mm (1/32 in.), 1/9 m^2 (1 ft^2),	Maximum dimension, 1.5 mm (1/16 in.), 1/9 m^2 (1 ft^2)
Fracture	Rupture of laminate surface without complete penetration	None	Maximum dimension, 21 mm (13/16 in.)	Maximum dimension, 29 mm (1 1/8 in.)
Air bubble (void)	Air entrapment within and between the plies of reinforcement, usually spherical in shape	None	Maximum diameter, 1.5 mm (1/16 in.); 2/in. $_2$	Maximum diameter, 3.0 mm (1/8 in.); 4/in. $_2$
Blister	Rounded elevation of the surface of a laminate, with boundaries that may be more or less sharply defined, somewhat resembling in shape a blister on the human skin	None	Maximum diameter, 3.0 mm (1/8 in.); height from surface not to be outside drawing tolerance	Maximum diameter, 6.5 mm (1/4 in.); height from surface not to be outside drawing tolerance
Burned	Showing evidence of thermal decomposition through some discoloration, distortion, or destruction of the surface of the laminate	None	None	None
Fish-eye	Small globular mass which has not blended completely into the surrounding material and is particularly evident in a transparent or translucent material	None	Maximum diameter, 9.5 mm (3/8 in.)	Maximum diameter, 13 mm (1/2 in.)
Lack of fillout	An area, occurring usually at the edge of a laminated plastic, where the reinforcement has not been wetted with resin.	None	Maximum diameter, 6.5 mm (1/4 in.)	Maximum diameter, 9.5 mm (3/8 in.)

Name	Definition	Visual Acceptance		
		Level	Level	Level
Orange-peel	Uneven surface somewhat resembling an orange peel	None	Maximum diameter, 14 mm (9/16 in.)	Maximum diameter, 29 mm (1 1/8 in.)
Pimple	Small, sharp, or conical elevation on the surface of a laminate	None	None	Maximum diameter, 3.0 mm (1/8 in.)
Pit (pinhole)	Small crater in the surface of a laminate, with its width approximately of the same order of magnitude as its depth	None	Maximum diameter, 0.4 mm (1/64 in.); depth less than 1 percent of wall thickness	Maximum diameter, 0.8 mm (1/32 in.); depth less than 20 percent of wall thickness
			Frequency and location to be determined by customer	
Porosity (pinhole)	Presence of numerous visible pits (pinholes)	None	Maximum of 25 pits (pinholes) in porous area of size listed in Level II	Maximum of 50 pits (pinholes) in porous area of size listed in Level III
Pre-gel	An unintentional extra layer of cured resin on part of the surface of the laminate (This condition does not include gel coats.)	None	Maximum dimension, 6.5 mm (1/4 in.); height above surface not to be outside drawing tolerance	Maximum dimension, 13 mm (1/2 in.); height above surface not to be outside drawing tolerance
Resin-pocket	An apparent accumulation of excess resin in a small localized area within the laminate	None	Maximum diameter, 3.0 mm (1/8 in.)	Maximum diameter, 6.5 mm (1/4 in.)
Resin-rich edge	Insufficient reinforcing material at the edge of molded laminate	None	Maximum, 0.4 mm (1/64 in.) from the edge	Maximum, 0.8 mm (1/32 in.) from the edge
Shrink mark (sink)	Depression in the surface of a molded laminate where it has retracted from the mold	None	Maximum diameter, 9.5 mm (3/8 in.); depth not greater than 25 percent of wall thickness	Maximum diameter, 14 mm (9/16 in.); depth not greater than 25 percent of wall thickness
Wash	Area where the reinforcement of molded plastic has moved inadvertently during closure of the mold resulting in resin-rich areas	None	Maximum dimension, 21 mm (13/16 in.)	Maximum dimension, 29 mm (1 1/8 in.)
Wormhole	Elongated air entrapment which is either in or near the surface of a laminate and may be covered by a thin film of cured resin	None	Maximum diameter, 3.0 mm (1/8 in.)	Maximum diameter, 6.5 mm (1/4 in.)
Wrinkles	In a laminate, an imperfection that has the appearance of a wave molded into one or more plies of fabric or other reinforcement material	None	Maximum length surface side, 13 mm (1/2 in.); maximum length opposite side, 13mm, (1/2 in.); depth less than 10 percent of wall thickness	Maximum length surface side, 25 mm (1 in.); maximum length opposite side, 25 mm, (1 in.); depth less than 15 percent of wall thickness
Scratch	Shallow mark, groove, furrow, or channel caused by improper handling or storage	None	Maximum length, 25 mm (1.0 in.); maximum depth, 0.125 mm (0.005 in.)	Maximum length, 25 mm (1.0 in.); maximum depth, 0.255 mm (0.010 in.)
Short	In a laminate, an incompletely filled out condition. (NOTE: this may be evident either through an absence of surface film in some areas, or as lighter unfused particles of material showing through a covering surface film, possibly accompanied by thin-skinned blisters	None	None	None

Reference.

1. NASA-Langley Research Center Procedural Requirements, Safety Program for Maintenance of Ground-Based Pressure Vessels and Pressurized Systems, LPR 1710.42, July 22, 2004.

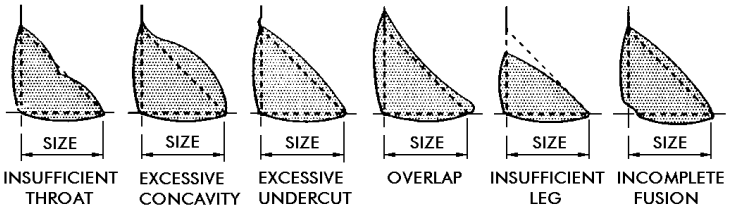


(A) DESIRABLE FILLET WELD PROFILES

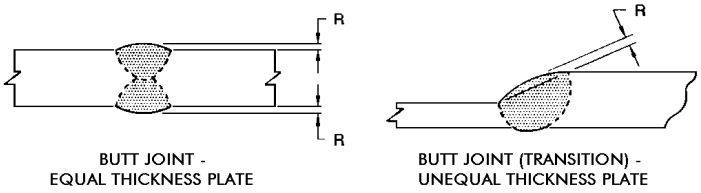
(B) ACCEPTABLE FILLET WELD PROFILES

Note: Convexity, C, of a weld or individual surface bead shall not exceed the value of the following table:

Measured Leg Size or Width of Individual Surface Bead, L	Max. Convexity
L ≤ 5/16 in. (8 mm)	1/16 in. (1.6 mm)
5/16 in. < L < 1 in. (25 mm)	1/8 in. (3 mm)
L ≥ 1 in.	3/16 in. (5mm)

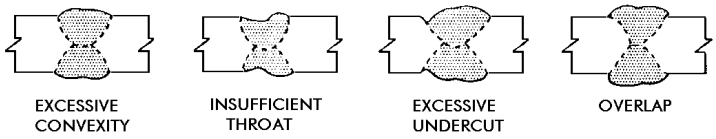


(C) UNACCEPTABLE FILLET WELD PROFILES



Note: Reinforcement R shall not exceed 1/8 in. (3 mm).

(D) ACCEPTABLE GROOVE WELD PROFILE IN BUTT JOINT



(E) UNACCEPTABLE GROOVE WELD PROFILES IN BUTT JOINTS

Figure 1 - Acceptable and Unacceptable Weld Profiles

A PRINTED AND SIGNED COPY OF THIS PROCEDURE MUST BE IN-HAND BEFORE BEGINNING ANY INSPECTIONS		
Approved By	Certificate Number	Date Signed
LaRC/ASNT Certified Level III Inspector		